CLAIMS

1. A refrigerator comprising a compressor having control means for controlling it in response to the temperature inside the refrigerator, characterized in that the control means are adapted to detect how the temperature inside the refrigerator varies due to the loading of a food item or to a similar event, and to adjust the cooling capacity of the compressor and/or its status (on/off) accordingly.
2. A refrigerator according to claim 1, characterized in that the control means are adapted to increase the cooling capacity of the compressor and/or the compressor run time proportionally to an estimated enthalpy (E) of the loaded food item.
3. Method for controlling the variable cooling capacity of a compressor in a refrigerator having a variable cooling capacity compressor, in which such control is based on temperature signal from a temperature sensor inside the refrigerator, characterized in that the variation of temperature due to the loading of a food item or to a similar event is detected and the cooling capacity of the compressor is adjusted accordingly in order to have a quicker cooling of such food item.
4. Method for controlling the status of an on/off compressor in which such control is based on temperature signal from a temperature sensor inside the refrigerator, characterized in that the variation of temperature due to the loading of a food item or to a similar event is detected and the compressor status, together with the compressor run time, are adjusted accordingly in order to have a quicker cooling of such food item.
5. Method according claims 3 or 4, characterized in that it comprises the following step:

- detecting any variation of the probe temperature above a predetermined average temperature value due to the loading of a food item inside the refrigerator;

- analyzing the shape factors of said probe temperature variation, preferably such shape factors being selected in the group consisting of derivatives, area, peak, overshoot duration, power spectrum or combination thereof;
- estimating the enthalpy (E) of the loaded food from the analysis of the probe temperature shape and related shape factors; and
- increasing the cooling capacity of the variable capacity compressor or the compressor run time of the on/off compressor so that the integral and/or the peak of the variation of the probe temperature below said predetermined average temperature is proportional to the estimated loaded food enthalpy.

6. Method according to claims 3 or 4, characterized in that it comprises the following step:
- detecting any variation of the probe temperature above a predetermined average temperature value due to the loading of a food item inside the refrigerator;
- estimating the integral of said probe temperature variation vs. time; and
- increasing the cooling capacity of the variable capacity compressor or the compressor run time of the on/off compressor so that the integral and/or the peak of the variation of the probe temperature below said predetermined average temperature, due to the increased cooling capacity of the compressor, is proportional to the integral of the variation of temperature above said predetermined value.

7. Method according to claims 3 or 4, characterized in that it comprises the following steps:
- detecting any variation of the probe temperature above an average predetermined value due to the loading of a food item inside the refrigerator;
- estimating the derivative of the probe temperature vs. time in the decrease of temperature due to the intervention of the control; and
- increasing the cooling capacity of the variable capacity compressor or the compressor run time of the on/off compressor so that the integral and/or

the peak of the variation of the probe temperature below said average predetermined temperature value, due to the increased cooling capacity of the compressor, is inversely proportional to said temperature derivative.

8. Method according to claim 4, characterized in that the cooling capacity u(t) of the compressor is adjusted with a control algorithm based on a PID technique according to the following formula:

$$u(t) = Kp * [e(t) + \frac{1}{Ti} * \int_0^t e(\tau) d\tau + Td * \frac{de(t)}{dt}]$$

where the temperature error *e(t)* is defined as: *e(t)= Tprobe-Ttarget,* Ti is the integral time, Td is the derivative time and Kp is a constant coefficient.

9. Method according to claim 8, characterized in that the parameters Ti, Td, Kp are adjusted according to an opening of the refrigerator door or from a sudden rising temperature detection in order to speed up the food cooling time.

10. Method according to claim 5 or 6, characterized in that parameters such as areas and derivatives of the measured temperatures are processed using soft computing techniques as fuzzy logic and neural networks to provide an estimation of the inserted food enthalpy and to adapt the compressor response by consequence.

11. Method according to claim 4, characterized in that the cooling capacity request is converted from a continuous quantity into a discrete quantity to control an on/off compressor.

12. Method according to claim 5, in which the compressor is switched on and switched off when the temperature inside the refrigerator reaches nominal cut-on and cut-off temperature respectively, characterized in that such cut-off and cut-on temperatures are reduced according to the estimated loaded food enthalpy and are progressively increased to the nominal values in order to provide an energy efficient temperature pull-down.